

Time: (3 Hours)

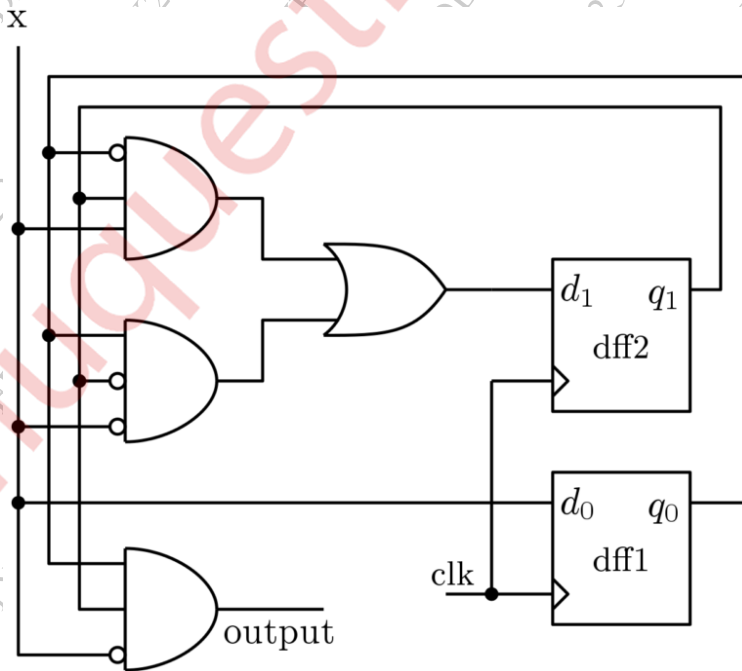
[Total Marks: 80]

- N.B.:** (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) Assume suitable data, if required and state it clearly.

1. **Attempt any Four**

- (a) Write a short note on Moore and Mealy types FSM. [5]
- (b) Compare signal and variable in VHDL with example. [5]
- (c) Write a VHDL code for negative edge triggered J-K flip flop with asynchronous preset and clear. [5]
- (d) Explain the features of VHDL. [5]
- (e) What are the steps involved in digital design with reconfigurable devices? [5]

- 2. (a) Draw a state diagram for a serial adder with minimum number of states.. Write a VHDL code for the same. [10]
- (b) Analyze the following sequential circuit and hence derive the state table and state diagram. [10]



3. (a) Design a Mealy sequence detector to detect an overlapping sequence of “0101” [10]
using T flip flop.
- (b) Write a VHDL code for 8x8 RAM. [10]

4. (a) [10]

Present state	Next state		Output	
	X=0	X=1	X=0	X=1
A	A	C	1	1
B	A	F	1	1
C	D	E	0	0
D	A	G	1	0
E	B	C	0	0
F	D	G	0	0
G	B	C	0	0

State the condition for equivalence of two or more states. Apply state reduction technique to reduce the following state table and hence draw a reduced state diagram.

- (b) Write a VHDL code for 4-bit bidirectional shift register with synchronous reset. [10]
5. (a) Write a VHDL code for i) 3:8 decoder ii) 3 bit synchronous UP counter in VHDL. [10]
- (b) Declare the modules in (Q. 5 a) as components and write a structural code for 8 bit ring counter. (at a time one out of 8 outputs is ‘1’ and this single ‘1’ keeps shifting serially along the 8 outputs.) [10]
6. (a) Explain the Booth’s Multiplication method and hence write a VHDL code for it. [10]
- (b) Design a coffee vending machine which accepts 10 rs (T) and 5 rs(F) coins [10]
through a, Cost of a cup of coffee is rs. 15. It has two outputs: coffee_out (C)
and return_money (R). If extra money is deposited, it returns the balance.

Assume that both the inputs T and F can not be 1 simultaneously.

Clearly state the assumptions if any.
